From:	Bucholtz, Paul (DEQ)
To:	Fortenberry, Chase
Cc:	Draper, Cynthia E; Garret Bondy; Griffith, Garry T.; Jeff.Keiser@CH2M.com; Todd King; Wood, Nicole; Synk, Polly (AG); Devantier, Daria W. (DEQ); Saric, James
Subject:	RE: EPA Preliminary Draft Comments on the OU 5, Area 1 FS
Date:	Thursday, October 31, 2013 1:48:59 PM
Attachments:	Draft_Area1_FS_comments.pdf

Chase,

Enclosed are MDEQs preliminary draft comments on the revised Area 1 FS. We will continue to refine the comments and I will let you know if any remaining issues come to light. As Jim mentioned, we are continuing to work on ARAR related issues with EPA.

Let me know if you need to discuss any of the comments in more detail. We will continue to be available as we work through the issues and develop a final document.

Paul

From: Saric, James [mailto:saric.james@epa.gov]
Sent: Wednesday, October 30, 2013 3:13 PM
To: Fortenberry, Chase
Cc: Draper, Cynthia E; Garret Bondy; Griffith, Garry T.; Bucholtz, Paul (DEQ); Jeff.Keiser@CH2M.com; Todd King; Wood, Nicole
Subject: EPA Preliminary Draft Comments on the OU 5, Area 1 FS

Chase,

Enclosed are EPA's preliminary draft comments on the Operable Unit 5, Area 1 revised Feasibility Study document. EPA may have additional comments, as we are working with MDEQ on a few remaining ARAR issues. We will get back to you with any further comments regarding those in the next couple weeks. Also, MDEQ will be sending you their draft comments on the Area 1 FS as well in the next few days.

Please give me a call to discuss how to address these before our 11/21 meeting. Also, we are available to discuss any of these comments before the meeting. We look forward to working with you to resolve these issues.

Thanks
Jim Saric
U.S. EPA Region 5
(312) 886-0992

MDEQ Comments

Area 1 Revised FS for Kalamazoo Superfund Site

The Area 1 Revised Feasibility Study (Area 1 FS) Report for the Kalamazoo River Superfund site represents a marked improvement in terms of presentation and style as compared to the original draft FS. MDEQ appreciates that several key pieces of information have been added to more clearly present the Kalamazoo River risks in a transparent fashion. Overall the document has less bias than previous documents. Treatment of fish consumption from the river is satisfactory, citing the 1994 MDCH health survey, which is the definitive evaluation of exposure, but was previously omitted in the SRI.

However, MDEQ has identified several critical issues that must be corrected to ensure that appropriate information is available to EPA and MDEQ to support selection of a protective remedy for Area 1.

Critical Remaining Issues

Issue 1: Comparison of Alternatives

Alternatives are compared based on the anticipated change in surface weighted average concentration (SWAC) and the corresponding change in fish tissue trends that would be expected. In this analysis, alternatives 3 and 4, which have differing remedial footprints are reported to produce the exact same change in fish tissue concentrations, despite a 25% reduction in post remediation SWACs (from 0.47 mg/kg for alternative 3 to 0.35 mg/kg for alternative 4). With the level of detail provided in the description of SWAC concentrations, it is difficult to evaluate the accuracy of this seemingly unlikely result. The expectation from two differing alternatives is some discernible difference in post remedial fish trends. Absence of any differences suggests that some mistake or unexplained assumption is present in the reported calculations that cannot be evaluated from the information in the report. Kern (2013) [1] provided simple equations for calculating change in SWAC based on an understanding of the areas and concentrations of remediated and un-remediated parts of each river section. It is recommended that Appendix A which documents SWAC methods should be expanded to include tabular results of the areas and associated SWAC values for remediated and un-remediated subareas so that the simple relationships provided in Equations 3 and 4 of Kern 2013 can be demonstrated to hold for the alternatives that have been evaluated. Results should be provided on a reach specific basis within Area 1.

MDEQ notes that there is considerable uncertainty in the post remediation sediment concentrations that will be achieved by each alternative and how fish tissue concentrations will respond either shortly following remediation or in response to further declines in sediment concentrations through natural recovery processes. As a result it is imperative that a robust plan for monitoring remedy effectiveness in conjunction with an expected future need for adaptive management be implemented as part of any selected remedy for Area 1 of the Kalamazoo River Superfund Site.

Issue 2: Change in Fish Tissue Concentration

In Alternative S-5 of the FS, fish tissue levels are assumed to decline after implementation of an active remedy by approximately 10% of the observed change in sediment PCB concentration associated with

[1] Kern, J. W. 2013. Allied Paper, Inc/Portage Creek/Kalamazoo River Superfund Site: Temporal Trends and Analysis of Selected Remedial Alternatives for Area 1 of the Kalamazoo River Superfund Site. Technical report for the Michigan Department of Environmental Quality. February 14, 2013.

that remedy. This assumed value was motivated by using the results obtained for Bryant Mill Pond as a model for predicting the effect of active remediation at other areas within Area 1. While this result is relatively well documented for Bryant Mill Pond, significant uncertainties remain in understanding of pre-removal concentrations and in in knowledge of actual areas where fish were exposed to PCBs. The Area 1 FS needs to incorporate these uncertainties by considering a range of potential effects of remediation that may be anticipated for the remedial alternatives.

Most Superfund Sites incorporate the use of biota-sediment accumulation factors (BSAFs) as the standard method for predicting concentrations in fish from those in sediment. The BSAF is a linear model (with or without carbon normalization), so a percentage change in sediment PCB concentrations results in the same corresponding percentage change in fish tissue PCB concentrations. For example a factor of two change in sediment concentrations would be predicted to result in a factor of two reduction in fish tissue concentrations which would be much more than the 5% change (Tables I-1 and 2) that would result from the assumptions used in the FS. This linear assumption of the BSAF may be somewhat optimistic, but is a standard approach and should be included in the FS analysis.

As a third alternative, Kern (2013) developed a regression model relating fish tissue PCB concentrations to sediment PCB concentrations which resulted in a non-linear relationship with accumulation rates being higher for low sediment PCB concentration ranges and lower for high sediment PCB concentration ranges. This regression function was well documented and provided relatively strong (high r^2) relationships between tissue and sediment that would fall intermediate to the BSAF approach or the linear assumption approach used in the FS.

It is recommended that the FS be revised to incorporate post remedial estimates of tissue trends based on the BSAF and the more recent regression approach. These analyses should be provided on a reach specific basis within Area 1.

Issue 3: Post Remedial Temporal Trends in Fish Tissue

The FS provides trend projections for fish tissue based on the assumption that concentrations will decline linearly with time. Furthermore, the predicted post remedial declines in fish tissue concentrations of 1%, 3%, and 5% are not well supported. Generally, contaminant concentrations in most media are understood to decay with time for a period, with some asymptotic behavior as sources of contamination reach background levels, which prevent further substantive declines. These types of trends are usually modeled with first order exponential decay functions or other time varying decay models. Simple physics based theoretical relationships governing accumulation and elimination of tissue PCB concentrations are generally inconsistent with the linear decline assumed in the FS. For example, the linear trends assumed in the FS would eventually result in negative tissue PCB estimates in the future.

The FS needs to be revised so that temporal trends in fish tissue levels are projected forward using a first order decay assumption and that the uncertainty in first order decay rates and corresponding sensitivity of estimates of time to risk based thresholds be included in the Appendices. These could be presented in tabular form summarizing upper and lower confidence limits for time to threshold.

Issue 4: Estimation of Post Remedial SWAC

The estimation of post remedial SWACs presented in Table 4-3 for Alternatives 3A&3B in Section 3 of Area 1 are overly optimistic. The estimates presented in the FS predict that removal of relatively small "hot spot" areas (MDEQ estimates 6% by area in this section) results in an order of magnitude drop in SWAC (7.37 to 0.74 mg/kg for the combined interval). Use of the stream tube method, ignores the

uncertainty associated with the concentrations estimated for each tube. The removal of tubes above the RAL overestimates the effectiveness of the remedy due to this uncertainty. MDEQ recommends that a post remedial SWAC be calculated using a ratio of the area remediated to the total area as illustrated by Kern. This alternative estimation of Post Remedial SWAC will likely bound the range of outcomes and should be presented.

Issue 5: Upstream Reference Area Selection

Reference Area Selection:(Risk Characterization, pages 21-25 and tables) As pointed out numerous times by MDEQ and EPA, Ceresco (ABSA 1), and not Morrow Lake, is the reference area for the Kalamazoo River as evidenced by the elevated mean concentration of PCBs in Morrow Lake sediment (0.373 mg/kg) relative to both Ceresco Reservoir (0.02 mg/kg) and Section 1 of Area 1 (0.11 mg/kg). . Therefore the risks of fish consumption from ABSA 1 need to be included in all tables and in the discussion, as this area represents the background and risks of fish consumption. Despite the ongoing debate regarding how to use Morrow Lake and Ceresco data for decision making, it is not acceptable to simply exclude risk information. As discussed in TCRA Effectiveness Section 1.3.4.1, page 1-36, the comparison of water levels to "background" at Morrow Lake and excluding Ceresco is not appropriate. Comparisons with data from both water bodies are necessary. In all areas of the document, data from Ceresco needs to be included.

Issue 6: Long Term Monitoring and Evaluation of Remedy Effectiveness

The future monitoring as described in Section 4.2.1 of the FS is inadequate given the uncertainties in post remediation sediment concentrations and the ability of natural processes to further reduce fish tissue concentrations over time.. Evaluation of PCB concentration trends in various media over time will be a critical aspect of MNR, which is included in all alternatives. Not only does this evaluation need to be conducted properly, but future data collection (monitoring) must be carefully designed to support evaluation of these trends and determine whether additional actions are warranted to achieve protectiveness. The level of future monitoring will depend on the degree to which MNR is relied upon for remedial options. Due to the high uncertainty associated with SWAC estimates and predicted fish trends, future long term monitoring designs should be robust. At a minimum they should track sediment, fish tissue and surface water concentrations on a sub area basis. Additionally the data sets should attempt to reduce the uncertainty in the data collected, so that the relatively modest concentration shifts in the various media, can be reliably estimated over time, and that such changes aren't lost in the "noise" of the data set. As data are collected and analyzed, findings may influence how data from downstream areas are evaluated, how remedial alternatives are developed, how data collection to support remedial design should be structured and how monitoring can be fine-tuned following later remediation efforts.

Current understanding of trends in fish tissue concentrations is supported by substantial data collected over many years. However, these data could not be collected to support evaluation of a specific remedy. Thus, collection of supplemental baseline data will be necessary, and should begin as soon as possible for Area1. Thus, an early effort in the remedial design phase should be developing a detailed plan for refining the Area 1 baseline on a river segment basis and for monitoring by segment post-remediation.

Further, it is recommended that the FS include a conceptual outline that, at a minimum, considers fish tissue, surface water and sediment monitoring and reflects the need for information on a segment-by-segment basis. This outline should consider the need for robust data that will be needed to reduce "noise" caused by differences in habitat, total organic carbon, tissue lipid concentrations, and stream

morphology. To emphasize, the recommendation is not for a detailed plan, but instead requests a conceptual outline from which such a plan can be developed during the early stages of remedial design.

Issue 7: Remedial Action Objectives

Replace RAO 1 in the FS with U.S. EPA's original language of April 25 as stated below:

Revised RAO 1:

> Protect people who consume Kalamazoo River fish taken from Area 1 from exposure to PCBs that exceed protective levels. The RAO is expected to be progressively achieved over time by meeting the following targets for fish tissue and sediment:
>
> - Reduction in the Michigan fish advisory level for smallmouth bass to two meals per month (0.11 mg/kg) total PCB concentration in fish tissue within 30 years
> - Achievement of a non-cancer HI of 1.0 and a 10-5 cancer risk within 30 years for the high-end sport angler (100 percent bass diet)
> - The fish tissue goal for bass will be achieved by reducing sediment PCB SWAC in each of eight segments of the river in Area 1 to 0.33 mg/kg or less as soon as possible following completion of the remedial action

Issue 8: Slope of riverine sub-sections may be a key indicator of PCB distribution

As shown in Figure 1, it appears that river slope may be a key indicator of average PCB concentrations. The FS should include a more robust evaluation of the effects of geomorphology on the distribution of PCBs in sediments.

Issue 9: The State of Michigan does not consider fish advisories to constitute institutional controls

The Michigan Department of Community Health (MDCH) does not support the use of the Eat Safe Fish (ESF) Guidelines issued by the Michigan Fish Consumption Advisory Program as an effective primary institutional control (IC) at sites of environmental contamination, such as a Superfund site. The FS should remove any reference to fish consumption advisories being ICs. The ineffectiveness and unreliability of fish consumption advisories must be addressed in the FS. However, the fish tissue target being considered in the FS is based on an assumption of 2 meals per month, which as a stand-alone goal, is not protective of human health without the use of fish consumption advisories. The MDEQ recognizes that fish consumption advisories will be part of the various remedial options and efforts to improve the effectiveness of institutional controls through community outreach efforts will need to be a part of a final remedy.

General Comments

In addition to the above critical issues, the following comments require additional discussion, resolution and inclusion in the FS.

1. Exposure Assessment Assumptions:
   (Exposure Assessment, pages 20-21) The document should make clear that for some of the exposure scenarios, only 50% of the consumption rate (West, 1989, 1993) is assumed taken from the river, in contrast to the Fox River FS and RODs. It would be useful to include a summary table to describe intake scenarios.

2. Protectiveness of ecological receptors: RAO 2 establishes that the remedy must protect aquatic ecological receptors from exposure to concentrations of PCBs in sediment that exceed protective levels for local populations. The goal of this RAO is to protect fish-eating birds and mammals by reducing fish tissue PCB concentrations to levels that do not harm the sustainability of local populations of these receptors. Fish tissue concentrations protective of mink are 0.5 mg/kg and 0.6 mg/kg for no observed and lowest observed adverse concentrations, respectively.

   Consistent with EPA guidance, RAOs should present an acceptable fish tissue level or range of fish tissue levels that are protective of human health and ecological receptors. The study should evaluate the feasibility of achieving these tissue levels.

3. Acceptable fish tissue levels may be achieved through a combination of active remediation (i.e., dredging or capping) and monitored natural recovery. In cases where it is not feasible to achieve protective fish tissue levels due to background concentrations, implementability or cost, protection may be achieved through a combination of active remediation and institutional controls (e.g., fish consumption advisories). However, as stated in the NCP:

   > "The use of institutional controls shall not be substituted for active response measures (e.g., treatment and/or containment of source material, restoration of ground waters to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of the remedy." 40CFR 300.430(a) (1) (iii)(D).

   This citation clearly indicates that institutional control should only be considered when dredging and capping based alternatives cannot practicably achieve the target cleanup level. (See also MDCH stance on use of fish advisories as ICs)

4. The MDCH does not support the use of the Eat Safe Fish (ESF) Guidelines issued by the Michigan Fish Consumption Advisory Program as an effective primary institutional control (IC) at sites of environmental contamination, such as a Superfund site.

   The U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-18, entitled "Recommended Evaluation of Institutional Controls: Supplement to the 'Comprehensive Five-Year Review Guidance" identifies fish advisories as "informational devices" that "do not provide enforceable restrictions" and are intended to "supplement" engineering controls ". OSWER 9355.0-89 EPA-540-R-09-001 (December 2012) provides further:

   > "For purposes of this guidance, when the term "IC" is used in a general manner that suggests enforceable restrictions are required, it should be assumed that informational devices themselves provide notice rather than enforceable restrictions."

   The ESF Guidelines do not meet the IC definition because they are neither enacted State of Michigan law nor are they promulgated rules and, therefore, they cannot be enforced by MDCH or any other agency.

   Further, it cannot be assumed that "notice" is reliably provided to all individuals who may consume fish from a contamination waterbody. The ESF Guidelines are available online and

to a limited extent in print, but MDCH cannot ensure that every angler fishing the Kalamazoo River has received a copy. In surveys of Saginaw River anglers, MDCH found that minority, female, and/or low-income angles were less likely to know about the ESF Guidelines. In addition, many people share or sell locally-caught fish and the consumer may not know the source of the fish or may not be aware of the ESF Guidelines.

For example, a survey conducted by the Wisconsin Department of Health of fish consumers from the Great Lakes region found limited that only 30% of women and 15% of black sport fish consumers were aware of advisories. Only 52% of all fish consumers followed fish consumption advisories.[2] A survey of over 900 anglers conducted by the Michigan Department of Community of Health (MDCH, 2000) found that less than 50% of anglers were aware of advisories for the Kalamazoo river and 44% consumed fish from the river. Those who consumed Kalamazoo river fish had elevated levels of PCBs as compared to those who did not consume Kalamazoo river fish, consistent with several Great Lake studies demonstrating PCB exposures via fish consumption (Johnson B.L., et al, Key Environmental Health Issues in the Great Lakes and St. Lawrence River Basins, Environmental Research, Vol 80 (2), S2, 1999; and Johnson, B.L., et al, Public Health Implications of Exposure to PCBs, Agency for Toxic Substances and Disease Research, Centers for Disease Control, HHS, 2008).

Lastly, fish advisories are not known to be effective at changing behavior, preventing exposure or protecting public health as demonstrated in the following references.

> "The effectiveness of fishing controls is an open question. The committee responsible for the 1997 NRC report was unable to find enough information to document or analyze the risk reduction of either fishing bans or advisories." National Academies Press (2001): http://www.nap.edu/catalog/10041.html ISBN: 0-309-58873-1. "Fish advisories should not be used as an institutional control to protect humans from exposure to contaminants;" [3]

OWSER Directive 9355.7-18 goes on to state that that "ICs are normally used when waste is left onsite and when there is a limit to the activities that can safely take place at the site (i.e,. the site cannot support unlimited use and unrestricted exposure)" and "It is critical to make sure there are enough IC safeguards and overlaps so no significant risk to human health ". The Kalamazoo River PCB contamination is not "onsite" and there is no "limit to the activities" regarding use of the River. Use of the ESF Guidelines as an IC in isolation of engineered controls or other remedial measures does not provide "safeguards or overlaps" to ensure that Kalamazoo River anglers will not ensure unacceptable risk as a result of eating locally caught fish.

5. The FS has selected a PCB target of 0.2 mg/kg, inappropriately based upon PCB levels in Morrow Lake bass. For completeness and transparency, the FS must consider the 0.11 mg/kg, 30 year goal for bass.

   a. The value of 0.2 mg/kg has not been shown to be a useful reference for predicting future fish tissue concentrations in Area 1. The FS is making an unsupported and likely incorrect assumption that PCB levels seen in Morrow Lake fish are predictive of

2 Imm, P. Knobeloch L, Anderson HA. Fish consumption and advisory awareness in the Great Lakes Basin. Environ Health Perspect. 2005 Oct;113(10):1325

[3] Hoover E. 2013 Ecological Processes 2:4 http://www.ecologicalprocesses.com/content/2/1/4

Kalamazoo River fish in Area 1 post remedy. Such a direct comparison cannot be made as bioaccumulation of PCBs is known to be higher in lakes than in rivers due to PCB residence time and other factors (e.g., organic carbon, food chain differences).

b. A 0.2 mg/kg fish tissue will not be protective of the reasonable maximum exposure (RME) bass consumer (a 10-5 cancer risk target is 0.04 mg/kg and 0.07 mg/kg for a HI=1) and certainly not the RME mixed diet, subsistence (low income, minority) fish consumer. In order to argue for fish target levels above 0.11 mg/kg in bass, the FS would need to quantitatively demonstrate that Morrow Lake will somehow limit fish PCBs levels to 0.2 mg/kg or some other level following remediation of the Kalamazoo River.

c. Morrow Lake could represent a limitation on reduction in fish tissue concentrations due to recontamination. However, evaluation of this issue must be based upon loadings or modeling. A 2003 evaluation[4] determined that only 1.3% of the total PCB mass now remaining in the Kalamazoo River has come from upstream over the Morrow dam. Specifically, the court, after reviewing data presented by experts, concluded the following: "Based upon these calculations the Court concludes that Morrow Lake was not a significant source of PCBs to the Site".

6. Preliminary estimates based upon mass indicate that future PCB loadings from Morrow Lake will have an insignificant impact following remedial actions. Expressed differently, the PCB loading from Morrow Lake, distributed throughout about 60 miles of the Kalamazoo River downstream are negligible compared to the existing inventory and sources of PCBs within Area 1.

7. The detailed analysis of alternatives must include evaluations that calculate the time to achieve bass fish tissue goals of all relevant risk thresholds including: 0.11 mg/kg (two meals per month), the 0.07 mg/kg (HI of 1.0) and the 0.04 mg/kg, 10-5 target. Tables and Figures (e.g., 4-1) and sections of the report will need to be revised accordingly. Simple summary bar graph figures showing years to each of the three risk based fish targets for each of the alternatives, should be placed in the body of the FS document, as existing figures of fish declines with time do not clearly illustrate the differences between alternatives. This information should support the fish tissue goals ultimately selected for the record of decision.

8. Additional evaluation is required of the feasibility of sand cover and stability during flooding events and ice scour, as the Kalamazoo River is generally shallow. If cover is considered, it is more likely that stone armoring will be required as found for remediation of the Fox River.

9. The use of SWAC estimates is appropriate for screening level conclusions as necessary to complete the FS evaluation. However, the need for additional sampling to delineate remedial action areas, for example in Sections 2 and 4 should be included in the discussions of the remedial alternatives.

[4] http://www.leagle.com/decision/2003994258FSupp2d736_1926

Specific Comments

Executive Summary

1. Summary statements regarding risks to Area 1 fish consumers and persons exposed to floodplain sediments seem transparent and appropriate. The FS acknowledges elevated risks to both populations.

Section 1

2. Section 1.2.1, page 1-2, 3rd para.: text states "A second USEPA-led TCRA is currently being implemented in the city of Kalamazoo along the stretch of Portage Creek in Area 1 between East Stockbridge Avenue and the confluence with the Kalamazoo River (USEPA 2011)." Work began at Reed Street, reference should be corrected.

3. Section 1.3, page 1-6, Table 1-1: add Plainwell Investigation data collected by MDEQ.

4. Section 1.3.1.1, page 1-8, para. 6, *Sampling between Crown Vintage Landfill and Plainwell No 2 Dam*: for clarity, a reference to the "FF-35" location would be helpful.

5. Section 1.3.1.1, page 1-10, para. 3, **SWAC and Confidence Interval Results**, the text states that "The SWAC values indicate that Section 3 should be the focus of additional statistical and geomorphologic evaluation to identify appropriate remedial alternatives." The SWAC evaluation appears to have appropriately identified Section 3 as an area of additional focus. However, the adjacent areas in parts of Section 2 (the upstream section) and Section 4 (the downstream section) should also be considered for additional sampling/remediation within the FS due to the presence of "hot spots" and the fact that the depositional regime did not abruptly change at the geographic features used to initially divide the Sections. Further, the text states "The SWACs for Sections 2 and 4 are relatively low with SWAC concentrations less than 1 mg/kg in each interval; however, their upper confidence bounds (95%) are relatively higher and hot spots have been previously identified in these sections." Use of section SWAC estimates as a screening tool is appropriate. Information for portions of Section 2 and 4, including the presence of "hotspots" and low slopes, suggest that consideration of additional sampling and remedial options beyond just the identified "hot spots" is also appropriate and should be added to the discussion.

6. Section 1.3.1.2, page 1-11. The text states "In Soil Area 1 with natural floodplains and no dams, the maximum (5.9 mg/kg), mean (0.46 mg/kg), and median (0.050 mg/kg) PCB concentrations are lower than in any other soil area." The maximum concentration appears to be under reported. It also seems appropriate to mention the uncertainty in the data set and the high degree of variability in the natural floodplain in Area 1.

7. Section 1.3.1.2, page 1-12, para. 6: the text states "Targeted sampling performed in low-lying areas showed the average PCB concentration in the natural floodplain soil in Area 1 upstream of the railroad bridge on the upstream edge of the Plainwell No. 2 Dam Area is less than 1 mg/kg across sample depths and within the surface soil (0 to 6 inches)." Floodplain sampling was neither "targeted" nor restricted to "low-

lying areas." The limited floodplain sampling in Area 1 outside of the impoundments results in a large uncertainty that must be recognized in the FS.

8. Section 1.3.2, page 1-17, para. 3, **Floodplains**: The text states "Impacted floodplain soil potentially serve as depositional areas for PCBs that are delivered during periods of flooding and that would reenter the river through surface runoff erosion processes. Given the generally flat topography and well-vegetated state of most of the floodplain in Area 1, mobilization of floodplain soil via erosion into the river is not expected to be a major transport mechanism." It should be noted that PCBs may also reenter the river through channel migration and bank erosion. The last sentence should state "Given the uncertainty associated with the Area 1 floodplain data, the importance of the soil/bank erosion mechanism remains uncertain but will be an important consideration during future monitoring.

9. Section 1.3.3.1, page 1-18, bullet 6: The text states "Residential developments exist next to the floodplains in three areas (the former Plainwell, Otsego, and Trowbridge Impoundments), with no restrictions in accessing the floodplain soil. The floodplain area next to the former Plainwell dam is the only soil exposure area included in Area 1." It is not clear why the downstream Areas are mentioned in relation to Area 1. Additionally, Plainwell Dam is not the only soil exposure area. Further, residential developments exist in and adjacent to the floodplains from Section 4 to the end of Area1. Additionally, soil exposure areas exist for the complete length of Area 1.

10. Section 1.3.3.1, page 1-19, **Fish Advisories**: The text appropriately states the limited utility of Fish Consumption Advisories (FCAs) to manage the risk associated with fish consumption. However, the remainder of the FS puts a heavy emphasis on the use of FCAs as institutional controls (ICs). The State of Michigan, does not consider FCAs to be ICs (See Attachment A). The report should clearly state the limits of the effectiveness of FCAs in managing risk.

11. Section 1.3.3.1, page 1-21 through 1-25: Tables 1-5 through 1-22 should include ABSA 1 (Ceresco) as a reference.

12. Section 1.3.3.1, page 1-27, para. 4: the text states "In general, assumptions made throughout this risk assessment were conservative in that they tend to overestimate exposure and resultant risk rather than underestimate it." References to overly conservative nature of the HHRA should be qualified.

    a. Estimates of fish consumption for the Kalamazoo River are taken from a survey conducted specifically for this fishery, which lessens uncertainties in fish consumption rates.

    b. The Kalamazoo River HHRA is not as conservative or protective as the HHRA for the Fox River. For example, the Kalamazoo River HHRA assumes a 30 year exposure and a 50% sport fish (bass) intake from the river while the Fox River HHRA and RODs were based upon a longer exposure period of 50 years and 100% sport fish (walleye) intake from the site. As a result the derived cancer and non-cancer risks for the Kalamazoo River are about three times lower (i.e., three times less conservative) than those used for risk management decision

making for the Fox River. In addition, the thirty year risk based goal of 0.11 mg/kg PCBs in bass has been selected for the Kalamazoo River, while the goal for the Fox River was 0.05 mg/kg in walleye.

13. Section 1.3.4, page 1-31 and 32. Table 1-23: Allied Paper Operable unit location on line 1, and the Bryant Mill Pond TCRA near the bottom of the table contain duplicative information.

Section 2

14. Section 2.3, page 2-2, **ARARs**: The State of Michigan has provided a list of State ARARs for use in preparation of the FS. This list was provided after the publication date of this document. Key issues that should be incorporated in the revised FS are:

    a. Clarify the basis for the cited water quality standard of 0.001 ug/L.

    b. The State of Michigan has established a water quality criterion for PCBs of 0.0012 ug/L for the protection of wildlife.

    c. EPA has established a recommended water quality criterion for the protection of human health of 0.000064 ug/L.

    d. Further discussion of water quality criteria that are considered ARARs should be provided in the draft FS.

15. Section 2.3.1.3, page 2-4, **Water-Specific ARARs**: Great Lakes Water Quality Guidance (PCB criterion of 3.9×10^{-6} ug/L) and MDCH fish consumption advisory "trigger levels" are identified as TBCs. The PCB criterion of 3.9×10^{-6} ug/L should be considered relevant and appropriate.

16. Section 2.4.5, page 2-14, **Selection of Sediment PRGs**: the target PRG of 0.33 mg/kg on a SWAC basis has not been demonstrated to be protective or consistent with the requirements of CERCLA. The last sentence should be removed as human populations will be left at risk, even if a PRG of 0.33 mg/kg in sediment is achieved.

17. Section 2.5, page 2-17, **General Response Actions**: The discussion of institutional controls (ICs) describes many reasons why ICs may be effective as a stand-alone technology. The IC discussion should note that ICs are typically used in conjunction with active remediation such as capping and dredging if achieving protective fish tissue concentrations is not feasible initially. ICs serve to enhance protection until such time that monitored natural recovery achieves protective fish tissue concentrations. This is how ICs are typically applied at contaminated sediment sites.

    Containment technologies may not reliably reduce contaminant mobility unless reactive amendments such as granular activated carbon (GAC) or organophillic clay are incorporated into the cap. The discussion of containment should include a discussion of both conventional and reactive capping approaches.

    The discussion of removal should note that while incomplete removal is likely due to re-suspension and residuals, residual management through placement of sand

immediately following completion of the removal action will reduce the post dredging surface sediment concentration and reduce the potential for contaminant release.

The discussion of disposal should at least mention on-site disposal. Although on-site removal can be eliminated through the technology screening step, the disposal general response action should include both on-site and off-site disposal.

Treatment should be added as a general response action. In-situ treatment using GAC has been shown to be effective for PCB contaminated sediments. Ex-situ treatment of dredged sediments may be required to meet land disposal requirements.

Section 3

18. Section 3.1, page 3-1, **Remedial Technology Identification and Screening:** The bulleted list of technologies presented in Section 3.1.1 should include containment. The discussion of containment suggests (but does not state explicitly) that capping was retained. The discussion of capping should note that capping is retained primarily for off channel areas due to water depth limitations within the main channel of the Kalamazoo River. ICs for floodplain soil are not expected to be effective for ecological receptors and should be eliminated as a remedial technology.

19. Section 3.1.2.3, page 3-6 (and various other pages throughout the report) **Institutional Controls:** The report suggests that ICs will only be considered for the former impoundment areas. The text should indicate that native floodplain soils also will require restrictions/notices to ensure that activities will not disturb PCB containing soils, or result in relocation of contaminated material within the floodplain.

20. Section 3.2.1, page 3-7, **Identification of Sediment Remediation Areas:** Hot Spot KPT-020 should be included as a remediation area within Section 2. Although the area of contamination appears limited to the near shore area, PCB levels in surface and subsurface sediments exceed 50 mg/kg as depicted in Figure 3-1.

21. Section 3.2.1.1, page 3-8, **Geomorphic-PCB RAL Analysis**: It is not clear in the report how the geomorphic data was "binned" to conduct the analysis. Additional information was provided to the MDEQ and is currently being reviewed. The final report will require additional explanation of how the analysis was conducted.

22. Section 3.2.1.1, page 3-8, para. 1: **Geomorphic-PCB RAL Analysis**: The revised FS indicates that the exclusion of the data from (hot spot KRT5/FF19) in Section 3 and (Crown Vantage side channel) in Section 4 was based on an agreement with the Work Group because of the unique geomorphic conditions at these areas. A description of the "unique geomorphic conditions" of these areas should be included.

    The geomorphic category of "confluence (entry point of a flowing side channel or tributary into the river" is identified. This category appears to be populated by data unique to the Portage Creek confluence. Unless this category includes a statistically

significant data set from several different areas along the complete length of Area 1, then this category should not be included as a geomorphic category.

23. Section 3.2.1.1, page 3-9, 6th para., **Geomorphic-PCB RAL Analysis:** The document indicates that, "The initial analysis also included sediment physical and chemical characteristics (grain size, percent solids, hard/soft designations from sediment probing assessments, and TOC). These sediment categories were not used for decision-making at this time because of limited sampling sites in Sections 2, 3, and 4." Yet, analyses using very small populations (e.g., n = 3) were included. The specific data used for the various geomorphic analyses should be provided in tables and on figures. The process used to evaluate the data set as appropriate for a particular analysis should also be described in the FS.

The revised FS proposes the analysis of several geomorphic categories for purposes of identifying "sections and subareas" requiring further evaluation of remedial alternatives. The first analysis is a statistical analysis of PCB concentrations in the various geomorphic categories. The analysis did not suggest strong positive relationships between PCB concentrations and the geomorphic categories. It is important to recognize that the "Backwater" and "Confluence" geomorphic categories were statistically analyzed with a maximum population of 4 each. It is later identified in the FS (i.e., in the RAL analysis) that "The statistical significance of the backwater is low..." The population size is insufficient and not representative and results in an invalid conclusion. This data gap is significant and should be addressed with additional sampling, similar to the TCRA area sampling needs. The collection of a data set representative of these categories and a statistically valid analysis are appropriate objectives that can be achieved with a reasonable level of effort. Incrementally sampling a representative subset of the off-channel population(s) is recommended.

The draft FS indicates that "Other specific channel position categories such as point bars… were considered, but not included… due to the lack of representative data within these categories." The "Backwater" and "Confluence" geomorphic category analysis should not be similarly dismissed in this FS due to lack of data. These geomorphic categories are expected to represent areas of elevated contaminant concentrations due to the strong relative potential for historical and current low energy deposition. The "Backwater" and "Confluence" geomorphic categories and the PCB contamination representative of these areas represent a significant data gap that should be properly evaluated as part of the FS.

It is not clear why box and whisker plots were only prepared for the transverse location data set and not for the other sets, including the curve position data set. A more thorough description of how the data was "binned" into the various geomorphic categories is required and a more thorough presentation of the data should be provided.

Section 3.2.1.1, page 3-9, 6th para.: **Geomorphic-PCB RAL Analysis:** The document also states "Although PCB presence may be positively correlated to a category, a sediment sample must be collected and analyzed for these parameters throughout

the Area in order to be predictive." This sentence should be edited to read "Although PCB presence may be positively correlated to a category, a representative and repeatable sediment sample data set must be collected and analyzed for these parameters throughout the Area in order to be predictive."

24. Section 3.2.1.2, page 3-13, **Identification of Sediment Remediation Areas (comment also applies to Figure 3-6 Process Flow Diagram: Identification of Area 1 Sediment Remediation Areas):** The revised FS indicates that "The overall process flow diagram for application of the SWAC and geomorphic-PCB analysis to identify sections and subareas requiring further evaluation of remedial alternatives is provided in Figure 3-6." To meet the intended objectives, the flow diagram should be revised to include three additional decisions after answering "yes" to the first decision (i.e., Are Section SWACs below or near sediment PRG (0.33 mg/kg) or below RAL of 1 mg/kg?), and before the "Does Section have any known hot spots?" decision. The first of these two additional decisions should be "Has the section been categorized into geomorphic categories?" the second additional decision should be "Have the geomorphic categories in this section been representatively characterized?" and the third is in parallel with an existing portion of the flow chart that asks "Statistically significant geomorphic category?"

25. Section 3.2.1.2, page 3-15, **Identification of Sediment Remediation Areas**: The report references Figure 3-2 for a depiction of proposed additional sampling areas. It is important that the ultimate extent of sampling be determined based on the results of this supplemental sampling event and not limited to the "red-hashed" area depicted on Figure 3-2, or be based solely on the current data. Given the considerable heterogeneity that exists in the system, it may not be appropriate to consider un-sampled areas as "clean" simply because they lack data. It would seem prudent that the objective of future sampling would include at a minimum, determining 1) reliable estimates of concentration averages, 2) contaminant heterogeneity, and 3) depth to clean.

    An important note with respect to depth to clean is that sample plans should consider that contaminated material was identified at a depth of some 10 feet below the creek bed near the Portage Creek Confluence.

26. Section 3.2.3.2, page 3-17,2nd para.: **Floodplain Soil Residential Exposure Analysis:** The report states that "Conditions in these locations [Plainwell Impoundment and Plainwell No. 2 Dam] would not be representative of residential properties along the remaining 20 miles of Area 1 or along Portage Creek." These areas should also be part of the analysis as residential properties adjacent to the 100 year floodplain are known to exist in the Plainwell Impoundment and residential properties are located adjacent to the Plainwell No. 2 Dam area along Douglas Street. Many residential properties are located along the River and Mill Race in the City of Plainwell, which has been eliminated from the analysis. All of Area 1 should be considered for selection of residential sampling targets.

27. Section 3.2.3.2, page 3-18,1st para., **Floodplain Soil Residential Exposure Analysis**: The report indicates that the Residential exposure analysis was an "indication of potential conservative residential exposure." Given the very limited

nature of the data set, and the variability of conditions along the river, exsisting uncertainty does not allow for such statements. The label "conservative" should not be used for data with high uncertainty.

28. Section 3.2.3.2, page 3-19, para. 1, **Floodplain Soil Residential Exposure Analysis**: The report references residential criteria of "2.5 to 15 mg/kg". The maximum criterion that should be considered for this initial evaluation is the Part 201, Generic Residential criteria of 4 mg/kg.

Section 4

29. Section 4.2.1, page 4-2, **S-2 Description:** Long term monitoring. Surface water monitoring should include TSS in addition to total PCBs. Sediment monitoring should be included if relevant to documenting whether RAOs are being achieved.

30. Section 4.2.2.1, page 4-3, **Overall Protection of Human Health and the Environment:** The evaluation of MNR should carefully assess the trend in reduction of fish tissue concentrations as detailed in the Kern analysis.

    The revised FS states that the time to achieve "human health and ecological exposure risk targets in fish" is 20 years for smallmouth bass and 46 years for common carp under the MNR alternative (S2). However, these estimates are based on target tissue levels of 0.23 and 0.29 mg/kg for bass and carp respectively based on tissue data collected from Morrow Lake. As stated previously, PCB fish tissue levels in Morrow Lake are not considered representative of free flowing reaches of the Kalamazoo River such as those that exist in Area 1. A more appropriate reference area is ABSA 1 which has PCB tissue levels of 0.026 and 0.13 mg/kg for bass and carp respectively. Under this scenario, it would take far longer to achieve these targets than is presented in the revised FS. Time to reach fish tissue targets should be evaluated against the 0.11 mg/kg fish tissue goal.

31. Section 4.2.2.2, page 4-4, **Compliance with ARARs:** TSCA Waiver – further discussion of the TSCA waiver is required. The ability to waive ARARs is limited. In this case, a technical impracticability (TI) waiver may be most appropriate. However, the basis for a TI waiver is unclear. In addition, it is unclear whether TSCA applies to material left in place. According to Table 2-3, TSCA establishes cleanup criteria for spills that took place after May 4, 1987. Soil cleanup levels are 1 – 10 mg/kg for unrestricted access and 10 – 50 mg/kg for restricted access. It is unclear whether TSCA applies to releases from the landfills to sediments in the Kalamazoo River or whether it applies only when TSCA waste is generated through removal.

    The revised FS states that a technical impracticability waiver is required due to the inability to meet Michigan NREPA water quality criteria due to low-level continuing sources to the river. While this is one approach, EPA may also apply its background policy to address low level concentrations of PCBs in surface water that are unrelated to the CERCLA release being addressed by the revised FS.

32. Section 4.2.2.3, page 4-4, **Long-Term Effectiveness:** Table 4-1 lists projections of the time to achieve fish tissue PRGs for MNR with future declines set at a fixed 2% per year. As stated previously, the basis for a fixed 2% reduction is not provided and

is not appropriate. Due to the uncertainty in the data, a 2% rate should not be considered conservative.

33. Ibid: Second, the target tissue levels are not protective of human health and are based solely on Morrow Lake, which is not considered representative of free flowing reaches of the Kalamazoo River within Area 1. Time projections to achieve fish tissue PRGs should be considered through the 0.11 mg/kg fish tissue goal.

34. Ibid: MDEQ agrees that MNR may be occurring to some degree as evidenced by higher PCB concentrations in subsurface sediments than surface sediments. However, further evaluation of the time to achieve target sediment levels is required to evaluate long term effectiveness of MNR (Alternative S2).

35. Section 4.3.2.1, page 4-6, 2nd para., **Overall Protection of Human Health and the Environment**: The use of a post remediation RAL of 1 mg/kg as a replacement value for the post-remedial SWAC may not be appropriate. For example, recent practice suggests that managing residuals through placement of a sand cap immediately following dredging activities will reduce release rates and result in more rapid reduction in sediment concentrations and allow more rapid achievement of remedial action objectives. Application of a 6" to 1' sand layer may result in a post dredge concentration of 0.1 to 0.2 mg/kg.

36. Section 4.3.2.1, page 4-7, 3rd bullet, **Overall Protection of Human Health and the Environment**: The revised FS states that "following completion of remedial activity under (Alternative S3), fish tissue concentration would decline at 3% per year." There is no information provided in the revised FS to support an estimated decline in fish tissue levels of 3% per year. 4.3.2.4, page 4-8, **Short-Term Effectiveness**: The discussion of short-term effectiveness should include some discussion of the potential for releases during dredging and whether any action is required to limit releases through best management practices or other controls (e.g., silt curtains, sheet pile, porta dams).

37. 4.4.2.4, page 4-10, **Short-Term Effectiveness**: The potential for releases during capping of sediments at Crown Vantage are also expected to be less for alternative S-3B than for Alternative S-3A.

38. 4.4.2.7, page 4-10, **Cost**: Additional costs associated with long-term monitoring may be required for capping based alternatives such as Alternative S-3B. Monitoring may include periodic cap inspections and chemical monitoring of porewater and/or sediment collected from the sediment cap surface.

39. 4.5.2.1, page 4-11, **Overall Protection of Human Health and the Environment**: The revised FS states that for Alternative S-4A, "projected future fish tissue trends following ROD issuance would be similar to those described for alternative S-3A." It is difficult to evaluate the accuracy of this seemingly unlikely result. It would be expected that two differing alternatives would result in some discernible difference in post remedial fish trends. Further evaluation of the time to reduce sediment and/or fish tissue concentrations for alternative S-4A/B should be included. The

removal of additional material relative to Alternative S-3A/B should facilitate more rapid reduction in sediment bed and resulting fish tissue concentrations.

40. 4.7.1, page 4-13, **S-5 Description**: Further evaluation is required to justify the selection of a sediment remedial action level (RAL) of 1 mg/kg. The FS must demonstrate that for each of the areas, remediation of sediment above 1 mg/kg in conjunction with MNR will be sufficient to meet the target sediment concentration.

The basis for the upper bound removal volume estimate is unclear. The upper bound estimate was developed based on grain size distribution. However, a grain size/contaminant concentration relationship is not provided in the revised FS to support this approach. The assumption that "60% of the total surface area of Area 1" would require remediation under this upper bound removal scenario may overestimate the volume of sediment requiring removal, especially considering the distribution of sediment contamination presented in Figures 1-4a – f.

The assumption that "implementation of this alternative is estimated to require 18 to 30 years to complete working with one crew sequentially from upstream to downstream" is not supportable. The assumption that there would only be one crew implementing the remedy is not reasonable and should be removed from the revised FS. The second scenario (6 to 10 years, with three crews working simultaneously) represents a reasonable approach.

As with other removal based alternatives, post remediation sediment concentrations should assume that residuals are managed through placement of 0.5' to 1' of sand which will result in lower post remediation SWAC estimates than an assumption of 1 mg/kg.

The estimates of the time to achieve tissue goals for Alternative S-5 are assumed using a 10 year remediation time frame. A six year estimate should also be included consistent with a 3-crew remediation scenario.

41. Table 4-9: MDEQ does not agree with the scoring or weighting of the alternatives in this table. These should be removed.

Section 5

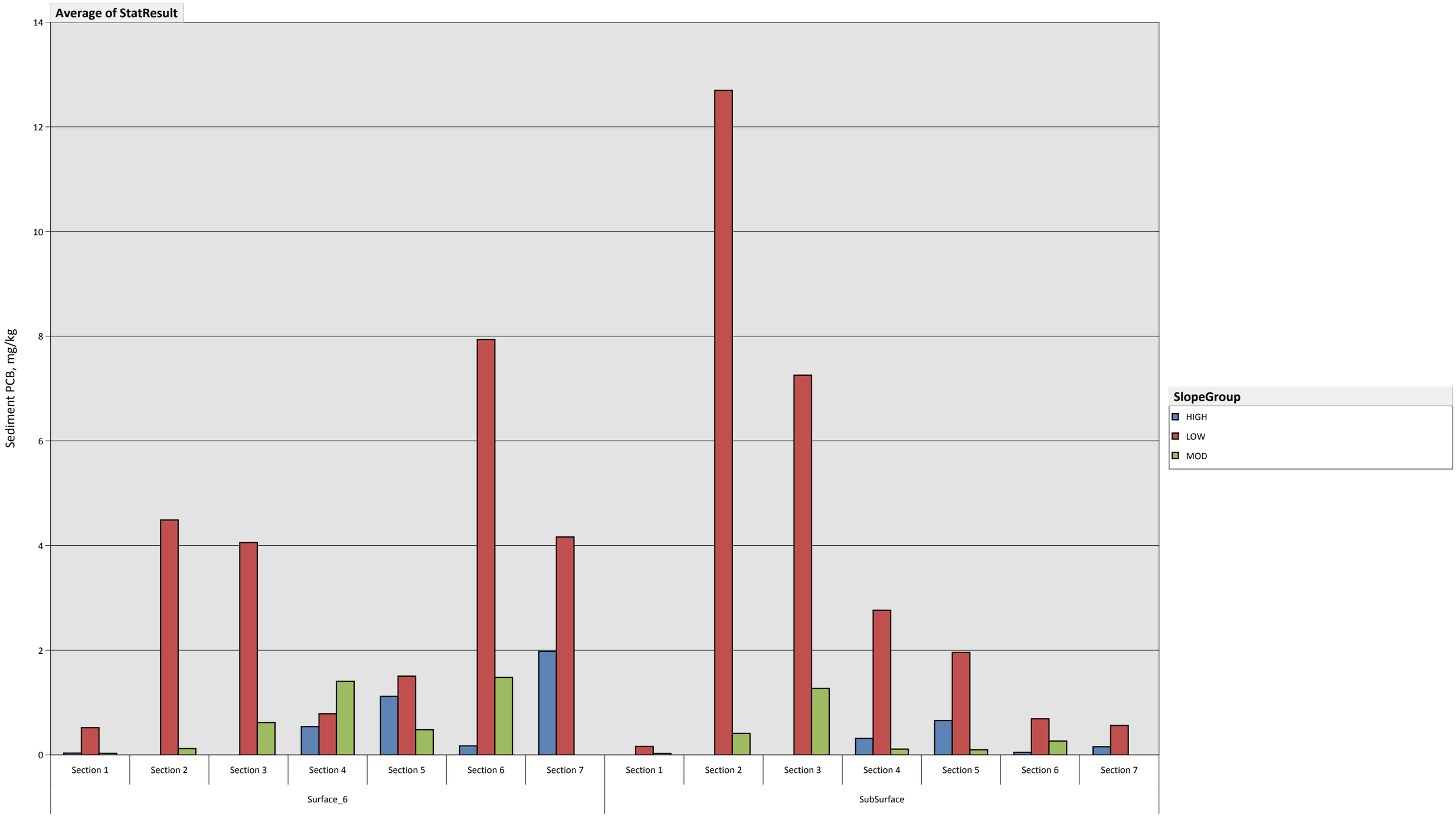
42. Table 5-5: MDEQ does not agree with the scoring or weighting of the alternatives in this table. These should be removed.

Section 6

43. Alternative rankings and preferences based on overall scores and weights from Table 4-9 and Table 5-5 should be removed from the discussions in this section

Geomorphic Slope

Drop Filter Fields Here



Depth2	SRI_REAC_1